

REMARKS

Status of the Claims

Claims 23 – 24, 38 – 44, 46 – 50, 52 – 54, 56 – 59, and 61 are pending. Claims 1 – 22, 35 – 37, 45, 51, 55, and 60 are cancelled. No claims are withdrawn from consideration.

Claim Amendments

The claim amendments are made without prejudice, and without disclaimer of the canceled and/or modified subject matter. Indeed, “[t]he language in the … claims may not capture every nuance of the invention or describe with complete precision the range of its novelty.”¹ Thus, “[t]he scope of [the present claims] is not limited to [their] literal terms but instead embraces all equivalents to the claims described.”²

The cancelation of claims 45 and 60 does not add new matter, because the cancelation does not affect the scope of any pending claims.

Objections to the Claims

The objection to claims 45 and 60 is moot in view of the cancellation of the claims.

Claim Rejections

I. Claims 45 and 60 stand rejected under 35 U.S.C. §112, second paragraph.

Applicants respectfully submit that this rejection is moot in view of the cancellation of claims 45 and 60.

II. Claims 23 – 24, 26 – 34, 38 – 50, 52 – 54, 56 – 59, and 61 stand rejected in view of 35 U.S.C. §103(a) and US 5,593,516 to Cassada III (hereinafter, “Cassada”).

A. Cassada’s solubility equations relating Mg and Cu levels are not merely preferred embodiments

¹ *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 535 U.S. 722, 731, 122 S.Ct. 1831, 1837 (2002).

² *Festo*, 535 U.S. at 731, 122 S.Ct. at 1837.

Applicants respectfully request reconsideration of whether all of the elements recited in claims 23 – 24, 26 – 34, 38 – 50, 52 – 54, 56 – 59 and 61 were known in Cassada, whether one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and whether the combination would have yielded nothing more than predictable results to one of ordinary skill in the art.

As expressed by the U.S. Supreme Court, “[t]he rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination yielded nothing more than predictable results to one of ordinary skill in the art.”³ Furthermore, “[t]he determination of obviousness is made with respect to the subject matter as a whole, not separate pieces of the claim.”⁴

The Office action holds the view that the examples and solubility equation teachings of Cassada do not teach away from a broader disclosure of non-preferred embodiments.

Contrary to the assertions in the Office action, Cassada’s solubility equations relating Mg and Cu levels are not merely preferred embodiments; they are mandatory. At column 2, lines 51 – 61, Cassada states,

In satisfaction of the foregoing objects and advantages, there is provided by the present invention an aluminum-based alloy consisting essentially of 2.5 – 5.5 percent by weight of copper, 0.1 – 2.3 percent by weight of magnesium, optionally 0.1 – 1.0 percent by weight of silver, and minor amounts of additional alloying elements to control grain structure during hot working operations and grain refinement. The relationship between the amounts of copper and magnesium are such that the solubility limit is not exceeded.

³ MPEP §2143, citing *KSR*, 550 U.S. at ___, 82 USPQ2d at 1395; *Sakraida v. AG Pro, Inc.*, 425 U.S. 273, 282, 189 USPQ 449, 453 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 62-63, 163 USPQ 673, 675 (1969); *Great Atlantic & P. Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 87 USPQ 303, 306 (1950) (emphasis added).

⁴ *Sanofi-Synthelabo, Inc. v. Apotex, Inc.* Fed. Cir. 2007-1438 (2008), citing *KSR Int'l Co. v. Teleflex, Inc.* 127 S.Ct. 1727, 1734 (2007); and *Kimberly-Clark Corp. v. Johnson & Johnson*, 745 F.2d 1437, 1448 (Fed. Cir. 1984).

Again, at column 3, lines 20 – 26, Cassada explains,

The aluminum-based alloy of the present invention consists essentially of 2.5 – 5.5 percent by weight copper, 0.10 – 2.3 percent by weight magnesium, and the balance aluminum, and wherein the total amount of magnesium and copper is such that the solid solubility limit of the alloy is not exceeded.

Preferred embodiments of the Cassada invention are described thereafter, in column 3, lines 26 – 50.

As discussed in the previous reply, these portions of Cassada teach away from the present invention. This is further emphasized by Cassada, Fig. 1 disclosing an upper line entitled "SOLID SOLUBILITY LIMIT" and another line for "SOLID SOLUBILITY LIMIT" is shown below the "PREFERRED ALLOY COMPOSITION LINE".

A teaching against represents the strongest evidence of nonobviousness. *Kloster Speedsteel AB v. Crucible, Inc.*, 793 F.2d 1565 (Fed. Cir. 1986). That an inventor would achieve an invention by doing what those skilled in the art suggested should not be done strongly argues against any assertion of obviousness.

Applicants respectfully submit the Office action erred by classifying Cassada's teachings against the present invention as preferred embodiments of Cassada. This classification was made by focusing only on column 3, lines 51 – 57 of Cassada to the exclusion of the reference as a whole. Applicants respectfully submit this limited reading also constitutes error, because "a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." MPEP §2141.02, citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) (emphasis in original).

Column 3, lines 51 – 57 of Cassada states,

In one aspect of the invention, the aluminum-based alloy has the major solute elements of copper and magnesium controlled such that the solubility limit is not exceeded. In this embodiment, the alloy is provided having higher toughness than prior art alloys as a result of a lower volume percent second phase (VPSP) due to low copper content.

When this portion of Cassada is properly viewed in the context of Cassada as a

whole, it is clear Cassada is describing an aspect or feature common to all embodiments. Indeed, as expressed above, Cassada explains this aspect is mandatory. Cassada does not disclose an aluminum-based alloy embodiment not controlling the major solute elements of copper and magnesium such that the solubility limit is not exceeded. Thus, the phrase, “in this embodiment,” in column 3, lines 51 – 57, refers to the broadest embodiment disclosed by Cassada.

As expressed in the previous reply, Cassada repeatedly states his solubility equations relating Mg and Cu levels are mandatory such that the solubility limit is not exceeded. At column 3, lines 58 – column 4, line 8, Cassada stresses the importance of its mandatory solubility equations, stating,

It has been discovered that combinations of both high strength and high toughness are obtained in the alloy of the present invention by controlling the range of composition of the solute elements of copper and magnesium such that the solid solubility limit is not exceeded.... It is important to avoid any excess solute that would contribute to the second phase content and diminish its fracture toughness.

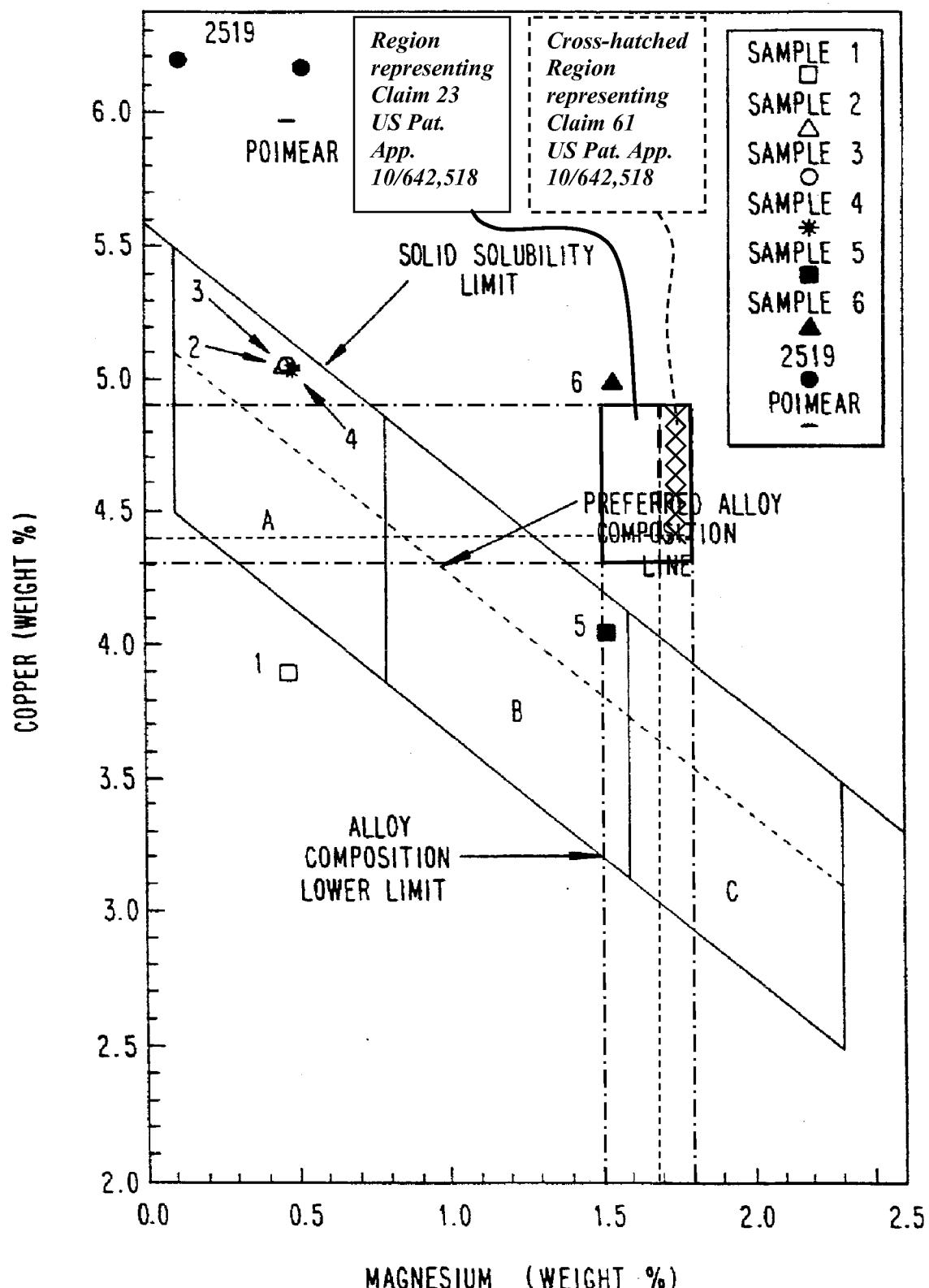
Applicants respectfully submit, therefore, a person having ordinary skill in the art at the time the present invention was made had no apparent reason to expect that the same or better properties would be achieved by compositions that do not comply with Cassada’s mandatory solubility equations.

The following table shows dependent claims recite Cu and Mg levels, which further avoid the composition region permitted by Cassada’s Cu_{max} and Cu_{min} equations.

Present Claim	Mg range	Cu	Cu permitted by Cassada's Cu _{max} and Cu _{min} equations for this Mg range
Claim 23	1.5 - 1.8%	4.3 - 4.9%	2.95 - 4.22%
Claim 38	1.5 - 1.8%	4.3 - 4.6%	2.95 - 4.22%
Claim 39	1.5 - 1.8%	4.4 - 4.5%	2.95 - 4.22%
Claim 40	1.5 - 1.7%	4.4 - 4.9%	3.04 - 4.22%
Claim 41	1.5 - 1.7%	4.3 - 4.9%	3.04 - 4.22%
Claim 54	1.68-1.8%	4.3 - 4.9%	2.95 - 4.06%
Claims 56 and 57	1.6 - 1.7%	4.3 - 4.5%	3.04 - 4.13%
Claim 58	1.6 - 1.7%	4.4 - 4.5%	3.04 - 4.13%
Claim 61	1.68-1.8%	4.4 - 4.9%	2.95 - 4.06%

The difference in the lowest amount of copper of Claim 58 and the corresponding highest amount of copper permitted by Cassada is 0.27%. The difference in the lowest amount of copper of Claim 61 and the corresponding highest amount of copper permitted by Cassada is 0.34%. These are large differences.

To emphasize this the following plot adds the region defined by the Mg and Cu ranges of Claims 23 and 61 to Cassada Fig. 1 which graphically shows the region of Mg and Cu combinations defined by the Cassada equations. The regions of Claim 23 and 61 do not overlap the region permitted by Cassada.



For at least these reasons, applicants respectfully submit a *prima facie* case of obviousness has not been established. A person having ordinary skill at the time the present invention was made had no apparent reason to violate explicit, emphatic, and repeated teachings of Cassada to arrive at the present invention, which clearly lies outside the ranges established by the mandatory Mg and Cu relationships defined by the Cassada equations.

Since a *prima facie* case of obviousness has not been established, a showing of unexpected results is in no way necessary. Applicants provide the following discussion, to facilitate a better understanding of the claimed invention.

B. Alloy 1 obtains an unexpected beneficial combination of properties.

The application presents data wherein Alloys 1 and 2 are compared to AA2024 and AA2524. The following Table A compares AA2024, AA2525, Alloy 1 and Alloy 2 of Tables 1-3, Cassada Alloy Sample 6, and present Claim 58.

Table A - Chemical composition, in weight %,

Alloy	AA2024 *	AA2524 *	1*	2*	Cassada Alloy Sample 6**	Present Claim 58***
Cu	4.4	4.3	4.4	4.4	4.91	4.4 - 4.5
Mn	0.59	0.51	0	0	-	0
Mg	1.51	1.39	1.68	1.61	1.61	1.6-1.7
Zr	0	0	0	0	0.11	-
Si	0.05	0.05	0.25	0.11	0.02	0.23-0.30
Fe	about 0.06	about 0.06	about 0.06	about 0.06	0.01	0.06-0.10
Ag	-	-	-	-	0.50	-
Cr	-	-	-	-	-	\leq 0.15
Cu permitted by Cassada						3.04-4.13

* balance aluminum and inevitable impurities

** V 0%, balance aluminum and inevitable impurities

*** balance essentially aluminum and incidental elements and impurities, which are at most 0.05% per element, 0.15% total; Claim 56 differs from Claim 58 by reciting Cu 4.3 to 4.5%.

The difference in the lowest amount of copper of Claim 58 and the corresponding highest amount of copper permitted by Cassada is 0.27%.

Alloys AA2024 and AA2524 are well known heat treatable alloys having useful strength and toughness properties in T3, T39, and T351 tempers as stated at page 1 of the present application. Alloy 1 achieves advantageous higher tensile yield strength (PS) than Alloy 2 as shown in Table 2 while also having toughness significantly higher than baseline as shown in Table 3.

Table 2 of the present application shows, in particular, Alloy 1 has almost a 5% improvement in PS over Alloy 2. Thus, Alloy 1 is closer than Alloy 2 to achieving PS of AA2024 and AA2524 while having better UTS and FTGR than AA2024 and AA2524. This results in a useful balance of properties which make Alloy 1 unexpectedly more favorable than Alloy 2 where the higher PS is desirable. It is respectfully submitted an unexpected improvement in only one property is enough to establish patentability.

MPEP 716.02.II.

Alloy 1 has higher Mg and higher Si than Alloy 2 and page 7 of the present application says, “Magnesium also provides strength to the alloy product.” However, the difference in Mg is only 0.07% from a base of 1.61%. This is too small to be the driving force to the higher tensile yield strength (PS) of Alloy 1 shown in Table 2 as stated in the Declaration of Dr. Alfred Heinz, Jan. 14, 2008, para. 21. In contrast, the 0.25% Si of Alloy 1 is more than double the 0.11% Si of Alloy 2. Thus, Alloy 1 has unexpectedly better tensile yield strength than Alloy 2 as shown in Table 2 due to the increased level of Si in Alloy 1 (Declaration of Dr. Alfred Heinz, Jan. 14, 2008, para. 21).

As explained above, Applicants assert this Declaration of Dr. Alfred Heinz is entitled to be given weight because an Examiner may not under 35 USC §103 substitute his own speculation for the factual knowledge of those skilled in the art.

Furthermore, claim 56 and particularly claim 58 encompass Alloy 1 within such a small range that it would be reasonably expected that the unexpected results occur over the entire range. Although objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support, the probative value of a narrow range of data can be reasonably extended to prove the unobviousness of a broader

claimed range when one could ascertain a trend in the exemplified data which would allow him to reasonably extend the probative values thereof. *In re Clemens*, 206 USPQ 289 (CCPA 1980).

Because claim 56 recites Si 0.23-0.30, on page 11, the Office action states with respect to claim 56, Applicant has not provided the differences between the properties of an alloy having a substantially similar composition with 0.22 weight percent silicon; and a composition having a substantially similar composition with 0.31 weight percent silicon. In other words on page 11, the Office action asserts applicants should compare alloys of claim 56 with alloys having substantially similar compositions, but having amounts of silicon barely outside the claimed range.

It is respectfully submitted the Examiner is incorrect to require this.

An Applicant need only show unexpected results compared to the closest example of the prior art. Applicant does not have to create prior art for a comparison. MPEP §716.02(e).III. In response to an obviousness rejection, to force an applicant to create prior art closer than the closest prior art ultimately results in the applicant comparing the invention with itself.

It is submitted Cassada Alloy Sample 6 is the closest exemplified alloy of Cassada to Claim 56 (Declaration of Alfred Heinz, Jan. 14, 2007, paragraph 15). It is noted Cassada states Alloy Sample 6 is outside its inventive alloy (Cassada, col. 8, lines 1-3; see also Declaration of Alfred Heinz, Jan. 14, 2007, paragraph 15).

Alloy 2 (outside Claims 56 and 58) is closer to Claims 56 and 58 than Cassada Alloy Sample 6. This is significant because proof of unexpected properties may be in the form of direct or indirect testing of the claimed invention and the prior art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Thus, patentability can be established by proof of improved results for the claimed invention in comparison with prior art even more closely related than the prior art relied upon by the Examiner. MPEP §716.02(e).I; *Ex parte Hunter*, 217 USPQ 265 (Bd. App. 1981).

Applicant has shown unexpected results of Alloy 1 (within Claims 56 and 58) compared to Alloy 2 (outside Claims 56 and 58) which is closer than Cassada Alloy Sample 6. This provides an indirect comparison to the closest prior art showing unexpected advantages of Alloy 1 over the closest alloy of Cassada. See MPEP

§716.02(e).I.

If Cassada has an example closer to Alloy 1 of the present application than Alloy 2 of the present application, the Examiner is encouraged to identify it.

Moreover, a *prima facie* case of obviousness has not been established and a showing of such detail is not required.

III. Claim 25 stands rejected in view of 35 U.S.C §103(a); Cassada; and US 6,562,154 to Rioja et al. (hereinafter, “Rioja”).

Rioja is not cited to compensate for the shortcomings of Cassada. Claim 25 depends from claim 23. Favorable reconsideration is respectfully requested in view of the discussion above regarding claim 23.

IV. Claim 31 stands rejected in view of 35 U.S.C §103(a); Cassada and Metals Handbook Desk Edition (hereinafter, “Handbook”).

Handbook is not cited to compensate for the shortcomings of Cassada. Claim 31 depends from claim 23. Favorable reconsideration is respectfully requested in view of the discussion above regarding claim 23.

V. Claim 60 stands rejected in view of 35 U.S.C §103(a) in view of Cassada and US 5,620,652 to Tack et al. (hereinafter, “Tack”).

Applicants respectfully submit that this rejection is moot in view of the cancellation of claim 60.

Fee Authorization

Please charge any shortage in fees due in connection with the filing of this paper, including any shortage in Extension of Time fees, to Deposit Account 14.1437. Please credit any excess fees to such account.

Conclusion

The present application is in condition for allowance, and applicants respectfully request favorable action. In order to facilitate the resolution of any questions, the Examiner is welcome to contact the undersigned by phone.

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